

IMPACT OF BRAIN-BASED LEARNING TOOLS IN MAINTAINING COGNITIVE RESERVE OF DEMENTIA PATIENTS - EXPERIMENTING WITH THE APPLICATION OF 'NASHEED'

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ABSTRACT

This paper investigates the role of brain-based learning tools, like the Muslim spiritual songs 'Nasheed' in maintaining the cognitive reserve (CR) of dementia patients and its role in mitigating the speed of progression of the spillovers of the disease impairment symptoms.

The author reviews the literature and presents close carer notes for the changes in the cognition capacity in the dementia case discussed, in continuation of previously published papers. The implication here is to focus on the role of the 'nasheed' like tools, as brain-based learning tools, in maintaining the cognitive reserve of dementia patients and those suffering memory loss due to aging.

Key words: Cognitive Reserve, Brain-based Learning, Dementia, Elderly Parents

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1. INTRODUCTION

This paper reviews the importance of cognitive reserve and its physiological impact in dementia patients. The role of brain-based activities as education, previous occupational attainment, besides leisure activities are emphasised in building cognitive reserve (CR), Jensen (2000), Barnett et al. (2006). The neural mechanisms underlying CR helps to appreciate and realise the brain-based learning tools, as in the case of the Islamic songs, called 'Nasheed'. Caine and Caine (1994).

Notes on the brain-based learning experience from the author, as a full time living close carer with an elderly parent with mild dementia symptoms, are presented in this work. The paper shows further the role of 'nasheed' like tools in creating relaxed alertness towards easy comprehension of dementia patients. Buheji and Buheji (2020), Gurland (1981).

2. LITERATURE REVIEW

2.1. Introduction to Cognitive Reserve

Cognitive reserve (CR) refers to individual differences in how specific tasks that are performed during earlier periods of our lives allow some people to be more resilient than others when they get dementia or aging disease, Stern (2002). CR was found to slow cognitive aging or reduce the risk of dementia, Barnett et al. (2006). This is a very important hypothesis need to be thoroughly investigated as the world is going rapidly towards aging economy, Buheji (2021).

Higher CR was found to mediate between brain damage and cognitive performance, representing a protective factor against cognitive dysfunction. However, advanced brain atrophy can suppress this protective function, which points to the importance of early intervention strategies, Sprenger (1999). In a study published in the Lancet, Stern (2012) mentioned that cognitive reserve (CR) can play a role in allowing dementia and geriatric patients to cope better than others with similar brain damage diseases. Gurland (1981).

2.2. Importance of Cognitive Reserve

The concept of the cognitive reserve has been put forward to account for individual differences in susceptibility to age-related brain changes and pathologic changes such as those that occur in dementia diseases. The presence of CR suggests that the brain actively attempts to cope with brain damage by using pre-existing cognitive processing approaches, or by enlisting compensatory approaches. Barnett et al. (2006).

This would allow an individual with high CR to better cope with the brain damage than an individual with lower CR. In CR, brain function rather than brain size is the relevant variable, Stern (2009). Thus, the CR is an active form of reserve that compensate for the same amount of brain damage, or deforms in pathology, and even when brain size is held constant. Stern (2002)

2.3. Physiology of Cognitive Reserve in Dementia Patients

In brain reserve, stimulating environments foster the growth of new neurons in the form of neurogenesis, which fosters neural plasticity, Valenzuela and Sachdev (2005). Still, while in some ways interdependent, brain reserve and CR make independent in addition to synergistic contributions to understanding individual differences in clinical resilience to brain pathology. Stern (2009).

Studies show that exercises that are cognitively stimulating activities may slow the rate of hippocampal atrophy in normal aging. While these ideas are promising and intriguing, they are beyond the scope of the current review, which will be limited to how CR may help cope with brain changes once they develop. The assumption sees that disease pathology slowly develops over time independently of CR. Stern (2002)

2.4. Role of Education and Occupational Attainment in Cognitive Reserve

Stern (2012) emphasis that individuals aged 60 years or older with less education had 2.2 times higher risk of developing dementia compared to those with more education and occupational attainment. This is supported by the US based census, which found that those elderly with low lifetime occupational attainment had 2.25 times greater risk of developing dementia than those with higher lifetime occupational attainment. The implication of these findings was that educational and occupational experiences imparted a reserve against the expression of dementia pathology. Gurland (1981)

2.5. Role of Leisure Activities in Building Cognitive Reserve

Studies show that there are certain activities that increase our CR, if done earlier and continued beyond sixty years old. Knitting, music, walking, visiting or being visited by friends or relatives, all found to play a role in better CR. Other activities as going to movies, or restaurants, or sporting events, reading magazines or newspapers, and reading a book, also found to be important to aging patients. Scarmeas et al. (2001)

Music and songs like ‘nasheed’ appear to be a unique and powerful stimulus for reaffirming personal identity and social connectedness in individuals with dementia, Devere (2017). In a previous study published by the author, Buheji (2020) found that watching or listening to selective songs on YouTube. Also, the research found that the community using games that excite fluid thinking besides going to worship in the mosque raised the CR. Such leisure activities are found to have 38% less risk of developing dementia, as Valenzuela and Sachdev (2005). The effects of lifelong learning, continuous education, and previous occupation, besides the level of mental activities, were found to reduce the incidences of dementia symptoms, due to the protective effect of the CR in decreasing the risks of dementia behaviours. Valenzuela and Sachdev (2005)

2.6. Neural Mechanisms Underlying Cognitive Reserve

As mentioned earlier, cognitive reserve (CR) refers to individual differences in how tasks are performed that may allow some people to be more resilient than others. The concept of cognitive reserve holds out the promise of interventions that could slow cognitive aging or reduce the risk of dementia and similar functional constraining diseases, Sumowsk et al. (2009).

Stern (2002) was one of the earlier researchers who proposed the concept of reserve and explained why it triggers individual differences in susceptibility to age-related brain changes and specifically dementia-related diseases. Stern saw that CR might be the reason why some people can tolerate some of the changes in their brain still maintain function. Later, more studies suggest that lifetime exposures, including educational, occupational attainment, and leisure activities in late life, can increase this CR. Scarmeas et al. (2001)

The neural mechanism works on the possibility of a connection between life experience, and the prevalence of dementia can be supported by a cognitive reserve (CR), Steffener et al. (2011). Stern has seen that their neural networks underlying task performance can be the main cause for such differentiation. The tentative explanation presumes that higher CR help to tolerate more pathological changes, so the point at which cognitive functions begin to be affected will be later than in those with lower CR. Sumowsk et al. (2009)

The key idea behind neural reserve is that CR might be mediated by the same networks that are utilised by individuals in the absence of age-or disease-related pathology. For example, the differential efficiency or capacity of these networks may account for individual differences in performance as well as individual differences in the ability to cope with brain change. Individuals with a high reserve will not demonstrate disease-related clinical symptoms as early as individuals with low levels of the reserve.

2.7. Realising the Brain-based Learning Tools for Dementia Patients

Devere (2017) seen that even though the explicit memory that is used for events, knowledge, and reasoning would gradually disappear, as dementia disease advances, certain activities remain preserved in most instances and are very resistant to decline. Among these activities, he mentioned enjoying music. The reason, as per Devere, is that music, and in our case, ‘nasheed’ is an activity that depends on procedural memory and where reasoning is not involved in the process. This might synchronise with the brain-based learning theory, which focuses on using the functioning of the brain to build new meaningful learning. Using how the brain works,

brain-based learning works on discovering the ways of maximum learning through emphasising on both explicit and procedural memory. Caine and Caine (1994).

Making connections among knowledge (including previous experiences) is essential in meaningful learning, which is highly needed for information retrieval. The meaningful learning in the context of lifelike and enriching experiences uses how the brain learns. Brain-based learning accepts the rules of brain processing and organising the cognitive reserve in mind, Caine and Caine (1994). It is a concept which tells how the fusion of common sense, human experiences and brain research produces useful tools and principles for the classroom environment. It does not give us a map to follow. But it provides us to think about the structure of our brain at the stage of making a decision. In short, brain-based learning is to learn with the brain in our mind (Jensen, 2000). Sumowsk et al. (2009)

Advocates of brain-based learning now refer to neuroscience on how the brain learns in effectively producing long-term learning. To build meaningful learning, relaxed alertness, and total immersion with the subject are required. Jensen (2000), Caine and Caine (1994).

Songs or 'nasheed' are found to play part of the agitation management therapy, and can complement other fluid thinking recreational activities, such as playing with puzzles and squeezing a ball. Devere (2017) sees this especially true for dementia patients since they respond better with individualized activities.

3. METHODOLOGY

The author refers to a case being researched and presented in detail in Buheji and Ahmed (2021), Buheji (2020), Buheji and Buheji (2020). Being a close carer for dementia elderly parent, the author explores in more detail the impact of 'nasheed' (Islamic songs) that focus on exciting the soul and mind on the listener and bring more interaction to poem words. Devere (2017).

The observations are presented in the case study to reflect the learning impact that improved the cognitive reserve seen on the dementia parent during more than 18 months of consistent interactions.

3. CASE STUDY

3.1. Notes on the Brain-Based Learning from Living as a Close Carer with an Elderly Parent

Buheji and Ahmed (2021) mentioned their 18 months of experience and close observation notes based on experiments to help develop the elderly parent cognitive functioning. The researcher has seen in that study that as the elderly parent loses gradually control over their physical abilities, independence, or cognitive abilities, their world could become filled with more unknowns; thus, he decided to trigger, or excite the capacity of attention, learning, and retrieval of memory of the elderly parent, Sprenger (1999). The main theme of the different settings reported in Buheji and Ahmed (2021) was to maintain the effectiveness of the dementia elderly parent 'cognitive functioning' and hopefully excite the 'cognitive reserve'. The other aim of this exercise was to refresh the dementia parent mind and spirit, which might enhance their capacity to associate, reason, and create judgments.

The other cognitive functioning that could enhance the cognitive reserve of the dementia parent is the capacity to learn and to acquire new knowledge. The carer, as reported in Buheji and Ahmed (2021), worked on raising the capacity of the mind to learn through altering the way information is delivered using the simple language and techniques in the 'nasheed'.

Besides this, at least one game every two days were applied to keep the dementia parent feel cognitively, or energetically challenged.

Buheji and Ahmed study confirms that working on sharpening the mental alertness and the ability to learn new material, clearly raised the capacity for decisions by the dementia parent. The researcher in this case study confirms that this is still the case, and he believes that altering the way information is delivered is found to raise the dementia parent capacity to learn and enhance also the parent's attention span'.

3.2. Role of 'Nasheed' in Relaxed Alertness towards Easy Comprehension in Dementia Patients

The author reports a personal experience about the role of Islamic songs (called 'Nasheed'), which are based on beautiful soul and belief words in meaningful learning for dementia patients, Buheji and Ahmed (2021). Active listening and interacting with the 'nasheed' bring in two important characteristics of being ready for comprehension through both the influence of relaxation and innate motivation. 'Nasheed' provide a dementia patient the environment for taking safe risks while interactively listening and reading the words of the song. These types of songs that move the soul and the mind help the brain to accept the suitable level of learning while being relaxed, and this enhances the stage of immersion.

However, the most immersion stage that was observed by the authors' case of a close dementia patient is when these songs are written, and the patient focuses on the coming texts while hearing the songs (the nasheed). This active processing activates the brain, moves the innate knowledge to conceptually harmonious meanings. The author hypothesis that here learning occurs where different neurons communicate with each other to fill the cognitive reserve. Neuroscientists emphasise that learning occurs when a neuron sends a message to another, Jensen (2000). The learning done through the 'nasheed' engages the entire physiology. Sousa (2000).

The brain-based 'nasheed' emphasise emotions and create a thematic setting that differentiates the interaction or learning, or the use of mental models that address the changing learning environment of the brain.

4. DISCUSSION AND CONCLUSION

4.1. Implication of this Study

The implication of this study suggests that exposing a dementia patient to brain-based learning through 'nasheed' enhance the cognitive reserve and its capacity to get engaged in longer mental exercises. However, the limitation her is that the details of what happens cognitively, or the way neural mechanism during the 'nasheed' is beyond the scope of this conclusion.

As a synthesis from both the literature and the case study, figure (1) illustrates the perceived mechanism of cognitive reserve in dementia patients when they get engaged with 'nasheed'. This suggests that using brain-based learning triggered by 'nasheed' similar tools, as per the culture suitable for the patient. Most important is that the tool should help toward building meaningful knowledge that creates resilience in relevance to aging memory loss or dementia diseases. Further studies are recommended to see if 'nasheed' and similar tools should be used to reserve pre-existing cognitive networks and recruit compensatory resources within the targeted patient.

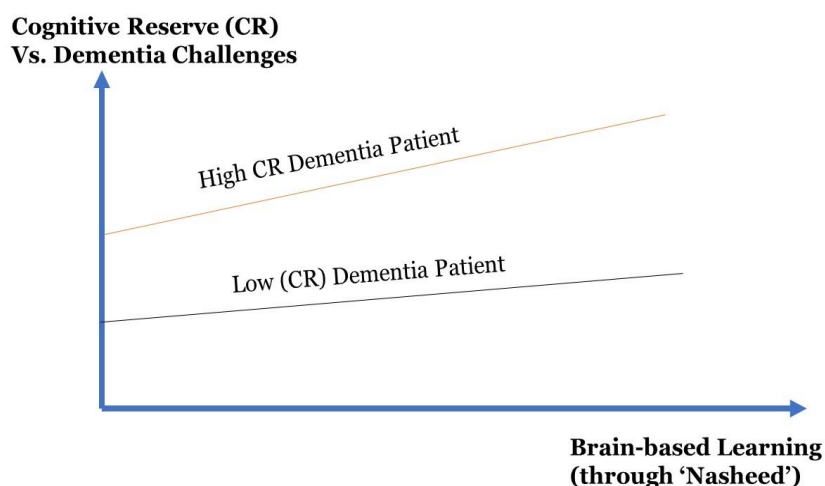


Figure 1 illustrates the Mechanism of Cognitive Reserve in Dementia Patients

4.2. Importance of Nasheed like Brain-based Learning for Maintenance of Cognitive Reserve

This paper proposes 'nasheed' or similar like brain-based learning tools that could create a holistic learning experience for the dementia patient where the mind interacts with the brain functions processor and could have an influence on the role of the neuron in creating 'learning through meaning'. The author hypothesises that 'nasheed' enhances the communication between the neurons and overcome the physiological restrictions while maintaining the cognitive reserve. The emotions and cognition created by 'nasheed' help the brain process and overcome restrictions patterns around the CR. However, again this needs to be further investigated through fMRI and other diagnostic tools.

'Nasheed' provides a learning setting that brings the dementia patient to better levels of both focused attention, and optimises peripherals perception. The author calls for further studies to the limitations of this paper and especially the role of the 'nasheed' and its like tools for maintaining the dementia patient spatial memory.

Finally, the author recommends further studies on the levels of brain-based learning created by the different 'nasheed' and its level of engagement, such as when the songs come with text writing. This might bring insights for another line of study in the future in the field of optimising cognitive reserve, especially we are going to be living in an aging economy soon.

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